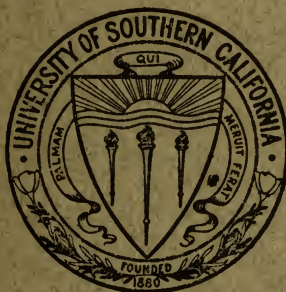


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UNIVERSITY OF
SOUTHERN CALIFORNIA
BULLETIN

MAY 1914



DEPARTMENT OF ENGINEERING

35th Street and University Avenue

Los Angeles, California

JUL 8 1914



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SOUTHERN CALIFORNIA
BULLETIN

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DEPARTMENT OF ENGINEERING

35th Street and University Avenue

Los Angeles, California

CALENDAR

1914

Sept. 10	Thursday	Registration begins.
Sept. 15	Tuesday	Instruction begins.
Oct. 6	Tuesday	University Founder's Day.
Nov. 26-27		Thanksgiving Recess.
Dec. 16	Wednesday	Christmas Recess begins.

1915

Jan. 4	Monday	Christmas Recess ends.
Feb. 2	Tuesday	Registration for second semester begins.
Feb. 4	Thursday	Instruction for second semester begins.
Mar. 29	Monday	Spring Recess begins.
Apr. 3	Saturday	Spring Recess ends.
June 1	Tuesday	Final examinations begin.
June 6		Baccalaureate Sunday.
June 10,	Thursday	Commencement Day.

Students entering engineering courses should register at the beginning of the university year, as a large number of courses begin at that time and continue for the entire year.

The registration days are Sept. 10 to 14 inclusive.

For other information, address

THE REGISTRAR,
35th St. and University Ave.
Los Angeles, Cal.

THE UNIVERSITY

The University of Southern California is situated in the city of Los Angeles, Cal., which is the metropolis of Southern California. It has a population of about 500,000, which represents every state of the union and many foreign lands.

Southern California is one of the best fields for engineering practice, offering a diversity of problems in Railroad, Hydraulic, Structural, Electrical, Mechanical and Chemical engineering.

The University includes the following colleges, each of which has a distinct faculty of instruction: College of Liberal Arts and Engineering, College of Physicians and Surgeons, College of Dentistry, College of Law, College of Theology, College of Pharmacy, College of Music, College of Oratory, College of Fine Arts, Marine Biological Station.

A preparatory school is maintained in connection with the College of Liberal Arts.

The university campus is in close proximity to Exposition Park, in which a million dollars has been recently expended in erecting and equipping buildings and beautifying grounds. The fifty-five acres of the park athletic grounds are available and afford ample facilities for all outdoor sports and furnish a good practice field for surveying problems.

GENERAL STATEMENT

Organization of the Engineering Department

The Engineering Department of the University of Southern California is a part of the College of Liberal Arts. The work of the Department is under the supervision of the Engineering Committee, consisting of five members of the faculty, appointed by the President of the University. This committee has charge of all matters relating to the work of the Department, including requirements for admission, outline of courses, credits, scholarship, granting of degrees, assemblies, discipline, etc.

Engineering Committee

The members for the year 1913-4 are:

George F. Bovard, D.D., LL.D.,

President of the University.

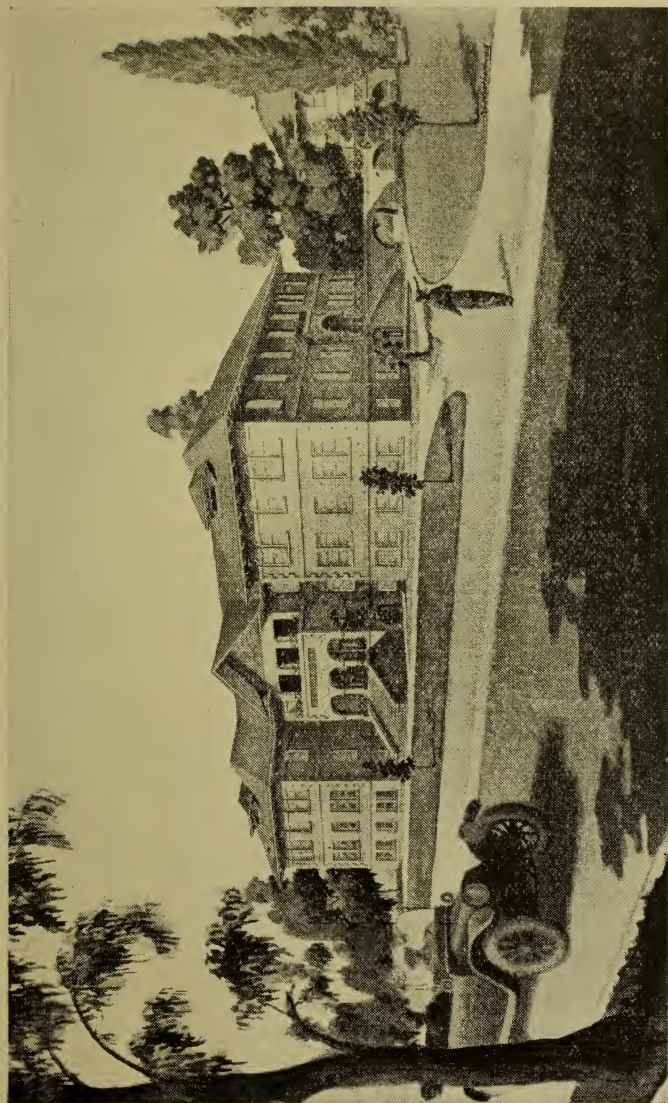
Charles W. Lawrence, C.E., Chairman.

Arthur W. Nye, M.E., Secretary.

Laird S. Stabler, M.S.

Gilbert E. Bailey, Ph.D.

J. H. Montgomery, E. E.



PROPOSED ENGINEERING BUILDING

FACULTY

GEORGE FINLEY BOVARD, A.M., D.D., LL.D.,
President of the University.

CHARLES WALTER LAWRENCE, B.S., C.E.,
Professor of Civil Engineering, Chairman of Engineering Committee.

ARTHUR WICKES NYE, B.S., ME.,
Professor of Physics and Electrical Engineering. Director of the Laboratory.

LAIRD JOSEPH STABLER, M.S., Ph.C.,
Professor of Applied Chemistry and Metallurgy.

WILLIAM LEES JUDSON,
Professor of Art and Architecture.

PAUL ARNOLD, Ph.M.,
Professor of Mathematics.

GILBERT ELLIS BAILEY, A.M., Ph.D.,
Professor of Geology and Mineralogy.

ROCKWELL D. HUNT, Ph.D.,
Professor of Economics.

ALLISON GAW, A.M., Ph.D.,
Professor of English Language and Literature.

LEROY SAMUEL WEATHERBY, A.M., Ph.D.,
Professor of Chemistry.

JOHN HAROLD MONTGOMERY, M.S., E.E.,
Professor of Physics and Electrical Engineering.

CLARENCE WESTGATE COOK, B.S. in C.E., M.A.,
Associate Professor of Civil Engineering.

HUGH CAREY WILLETT, A.M.,
Associate Professor of Mathematics.

ARTHUR CLASON WEATHERHEAD, A.B.,
Instructor of Drawing and Architecture.

HARRY JAMES MOORE, B.S. in C.E.,
Instructor of Civil Engineering.

CHARLOTTE MAUDE BROWN,
Librarian.

Field Assistants in Civil Engineering

Edwin C. Franklin

Edwin Leroy Gholz

Laboratory Assistants in Physics

Loren T. Clark

David B. Munroe

Harry E. Reddick

Edward C. Snyder

Laboratory Assistants in Chemistry

Grace I. Ashmore

John G. Bamesberger

Ralph T. Goodwin

Eugene M. Hughes

Leland L. Rebber

Claude E. Swift

ADMISSION

Candidates for admission to Freshman standing must be at least sixteen years of age and must present evidence of good moral character. They must also give, either by certificate or examination, evidence of preparation in fifteen units of preparatory subjects, which must include the following:

English	2 units*
A Modern Language	2
Chemistry	1
Physics	1
Elementary Algebra	1
Advanced Algebra	1
✓Plane Geometry	1
✓Trigonometry and Solid Geometry.....	1
United States History and Civics.....	1
Freehand Drawing	1
✓Mechanical Drawing	1
Electives	2

*The term "unit" is here used to denote a preparatory subject studied through one school year with five class exercises (or the equivalent) per week.

Tuition, a semester, payable in advance.....\$45.00
(Special rates will be made to students registering
for less than ten hours. **Five dollars** of the above is
registration fee and is not refundable.)

Diploma Fee, payable 30 days before graduation.....	5.00
Laboratory Fees, per semester:	

Assaying.....(to be arranged with Treasurer)	
Chemistry	8.00
Electrical Engineering, two- and seven-dynamo laboratories, each	8.00
Physics:	
Courses 1 and 2, each.....	4.00
Courses 3, mechanics	4.00 to 6.00
Course 4, shop	6.00
Course 6, electrical measurements.....	6.00
Surveying, field work.....	2.50
	4.00

Students in Chemistry deposit a breakage fee of \$5.00 which, after deducting the cost of goods broken, will be refunded at the close of the year.

The four year courses in Civil Engineering, Electrical Engineering, Architecture and the two-year course in Mining and Chemical Engineering are well established courses, having a rigid outline of study with little time for elective work.

The four year courses in Civil Engineering, Electrical Engineering and Architecture lead to the degrees of Bachelor of Science in Civil Engineering, Electrical Engineering or Architecture.

The course is designed to give a practical as well as a theoretical training. Nearly as much time is spent in the drawing room, laboratory, and field as in the lecture room.

By consulting the schedule following, it will be seen that considerable time is devoted to Mathematics, English, and the Sciences. Of the more technical work, Field Engineering is given very full treatment in lecture room, office, and field.

In the third year Theoretical Mechanics is thoroughly developed and forms the basis for the designing and construction that occupies the remainder of the course. The importance of correct methods of thought and practice is constantly insisted upon.

A very large amount of important engineering work is continually going on in the vicinity of Los Angeles. The proximity of harbors, mines, irrigation and water supply projects, several transcontinental railroad terminals, and extensive electric power plants and railway systems, offers a diversity of excellent examples of engineering construction. Students in this department, accompanied by instructors, are required to inspect much of this work and to present written reports on what they have seen.

First Year Civil and Electrical Engineering

	First Semester	Second Semester
English, 1	3	3
Mathematics, 4, 5, 6.....	4	5
Chemistry, 2, 2a, 3, 3a.....	5	5
Civil Engineering, 1.....	2	2
Civil Engineering, 2 (Field Work).....	2	2
Drawing, 4, 5.....	2	2

Second Year, Civil Engineering

	First Semester	Second Semester
Mathematics, 7, 8—Calculus.....	3	3
Geology, 2—Mineralogy	2	2
Drawing, 6—Descriptive Geometry.....	2	2
Physics, 1abc, 2abc.....	6	6
Civil Eng., 13—Materials of Construction....	3	....
Civil Eng., 3—Higher Surveying.....	....	4

Third Year		Lab.	Class
		Hours	Hours
FIRST SEMESTER			
Civil Eng., 7—Analytical Mechanics.....	....	3	
Civil Eng., 8—Mechanics of Materials.....	....	2	
Civil Eng., 15—Graphical Statics.....	3	....	
Civil Eng., 4—R. R. Engineering Theory.....	....	2	
Civil Eng., 5—R. R. Engineering Practice.....	8	....	
Elect. Eng., 1—General.....	....	5	
Elect. Eng., 4—Steam Engineering.....	....	2	
SECOND SEMESTER			
Civil Eng., 7.....	....	2	
Civil Eng., 8.....	....	3	
Civil Eng., 16—Stresses.....	....	3	
Elect. Eng., 5—Steam Engineering.....	....	2	
Civil Eng., 9—Hydraulics.....	....	3	
Civil Eng., 5 and 6—R. R. Engineering.....	3	2	
Civil Eng., 18—Structural Design.....	6	....	
Fourth Year			
FIRST SEMESTER			
Civil Eng., 21—Reinforced Concrete.....	3	2	
Civil Eng., 18—Structural Design.....	6	1	
Geology, 5 .....	....	2	
Mathematics, 12—Astronomy .....	....	2	
Civil Eng., 11—Water Supply.....	....	2	
Civil Eng., 12—Sanitary Engineering.....	....	2	
Civil Eng., 10—Irrigation Engineering.....	....	1	
Economics, 1 .....	....	3	
Civil Eng., 23—Thesis.....	3	....	
SECOND SEMESTER			
Civil Eng., 18	6	....	
Geology, 5 .....	....	2	
Mathematics, 12 .....	....	2	
Civil Eng., 21—Reinforced Concrete.....	3	2	
Civil Eng., 22—Contracts and Specifications.....	....	1	
Civil Eng., 19—Highway Engineering.....	....	2	
Civil Eng., 23—Thesis.....	6	....	
Economics, 1 .....	....	3	

COURSES IN CIVIL ENGINEERING

1. **Surveying.** Recitations and lectures on the theory and practice of plane surveying. The course includes the use and care of instruments; methods of procedure and of keeping notes for land, city, and mining surveys; instruction in computation and platting of field notes. Prerequisite, a course in plane trigonometry. Two units, throughout the year.

Text—Breed and Hosmer's Principles and Practice of Surveying. Vol. I.

2. **Surveying Field Work.** The practical adjustment of surveying instruments; the proper method of keeping clear field notes, and the working of field problems with chain, tape, level, plane table, transit, compass, etc. The work in the drawing room consists of platting the field notes and making profiles and maps. Six hours, throughout the year, course 1 to be taken concurrently.

Text—Pence and Ketchum's Field Manual.

3. **Higher Surveying.** Topographical surveys with plane table and stadia, city surveys, mine surveys, measurement of base lines and triangulation systems, determination of meridian and latitude. Prerequisite, courses 1 and 2. Six hours' field work and two lecture periods per week.

Text—Breed and Hosmer. Vol. II.

4. **Railroad Engineering.** A course including the theory of curves, switches, and sidings; the making of reconnoissances and preliminary and location surveys; the computation of earthwork and determination of structures; and the making of final estimates of cost. Prerequisites, courses 1 and 2. Two hours; first semester.

Text—Allen's Railroad Curves and Earthwork.

5. **Railroad Engineering, Field and Office Work.** Practice in laying out curves, making a complete survey for a short line of railway, and doing the office work. Course 4 must be taken concurrently. Six hours first semester, three hours second semester.

Text—Allen's Railroad Curves and Earthwork.

6. Railroad Engineering. The fundamental principles of economical location, construction and betterment surveys; a discussion of yard and terminal design; the study of the permanent right of way in regard to its relation to maintenance and operation. Prerequisite, course 4. Two hours; second semester.

Text—Raymond's Railroad Engineering.

7. Analytical Mechanics. The mathematical treatment of statics, kinematics and dynamics, including the determination of center of gravity, moment of inertia, centrifugal force, etc. Prerequisite, Mathematics 8 and 9. Three hours, first semester; two hours, second semester.

Text—Hancock's Applied Mechanics for Engineers.

8. Mechanics of Materials. A mathematical course in the resistance and elasticity of materials, stresses and strains, shearing, flexure, beams, columns, and shafts. Course 7 must be taken concurrently. Two hours, first semester; three hours, second semester.

Texts—Slocum and Hancock's Strength of Materials, and Shepard's Problems in Strength of Materials.

9. Hydraulics. Hydraulic pressure, strength of pipes, flow of liquids through pipes and orifices and over weirs, losses of head, flow of water in open channels, dams of masonry and earth, hydraulic motors and machinery. Prerequisite, course 7. Three hours, second semester.

Text—Hughes and Safford's Hydraulics.

10. Irrigation Engineering. Diversion, conveyance, and application of water for irrigation. Design of reservoirs, dams, and diversion works. One hour; first semester.

Text—Wilson's Irrigation Engineering.

11. Water Supply. The determination of the quantity and quality of supply, water purification and conservation, design of a system. Prerequisite, course 9. Two hours; first semester.

Text—Turneure and Russel's Public Water Supplies.

12. Sanitary Engineering. The drainage of buildings, treatment and disposal of sewage, sewer systems for cities. Prerequisite, course 9. Two hours; first semester.

Text—Kinnicuh's Sewage Disposal.

13. Materials of Construction. A study of the manufacture and properties of stones, cements, concretes, timber, iron, steel, etc., with special attention to the determination of the safe working stresses. Three hours; first semester.

Text—Johnson's Materials of Construction.

15. Graphical Statics. The graphical determination of the stresses in engineering structures. Course 7 must be taken concurrently. Three hours, one unit; first semester.

Lectures and Drafting.

16. Stresses in Framed Structures and Arches. The analytical and graphical methods applied to determining stresses in roof and bridge trusses and masonry arches. Prerequisite, course 15. Three hours; second semester.

Text—Turneaur's Modern Framed Structures.

17. Engineering Laboratory. The testing of engineering materials. Prerequisite, course 13. Three laboratory hours; first semester.

Smith-Emery Testing Laboratory (by special arrangement).

18. Structural Design. The theory for and practice of making complete designs for steel bridges, roofs and other structures. Lectures, drawing, and computing. Prerequisite, courses 8, 13 and 16. One hour lecture, six hours drafting.

Text—Thayer's Structural Design, Vols. I and II.

19. Highway Engineering. Roads and streets of broken stone, paved and oiled roads, the location of new roads. Two hours; second semester.

Text—Baker's Highway Engineering.

21. Reinforced Concrete. The theory, design, construction and estimates of concrete and reinforced concrete structures including buildings, foundations, retaining walls, tunnels, culverts, dams, chimneys, arches and bridges. Two

hours lecture, three hours designing; throughout the year.

Text—Hool's Reinforced Concrete Construction, Vols. I, II, III.

22. Contracts and Specifications. A synopsis of the law of contracts as applied to engineering construction and a study of typical contracts and specifications. The course includes riparian rights, boundary lines, survey descriptions, etc. One hour; second semester.

Text—Wait's Law of Contracts.

23. Thesis. A study of some special engineering problem or an independent investigation by the student. The subject must be approved by the professor in charge of the department of Civil Engineering and by the professor who would have immediate direction of the work proposed, not later than November 1st of the senior year. It must be completed and submitted by June 1st of the same year. One, hour, first semester; two hours, second semester.

ELECTRICAL ENGINEERING

The courses offered in this department are designed to fit young men to engage in the operation and production of electrical apparatus, and also in the application of electricity to the Arts and Sciences.

During the freshman and sophomore years there is laid a broad foundation, consisting of Physics, Mechanics, Chemistry, Surveying, and Drawing. During the junior and senior years special studies in electricity and applied electricity are pursued. These involve the theory of electricity and magnetism with application to direct-current machines and measuring instruments, and alternating-current machinery and apparatus, comprising alternators, synchronous and induction motors, transformers and rotary converters. Courses are also given in Electrical Distribution and Transmission, and Lighting and Power Plants.

The work of the engineering laboratories is co-ordinate with that of the lecture and class room, and aims to give a practical knowledge of electrical measurements and the handling of electrical machinery.

Southern California, in its present state of rapid development, offers exceptional opportunity to the hydraulic and electrical engineer. The work of the University is excellently supplemented by the large amount of work under construction. The engineers and superintendents in charge of these have been very courteous in aiding the classes on their various trips of inspection. The various power and electric plants in and about Los Angeles afford examples of electric development of high-tension and power transmission not surpassed by those of any other city in the United States. Various excursions are made to these plants, which are explained in detail by the superintending engineers.

Required Course in Electrical Engineering

The course of study is the same for all engineering courses during the first year. For detailed statement, see Civil Engineering course, page 11.

Second Year

	First Semester	Second Semester
Mathematics, 7, 8—Calculus.....	3	3
Physics, 1abc, 2abc.....	6	6
Elect. Eng., 4, 5—Steam Engineering.....	2	2
Physics, 4—Shop	1	1
Civil Eng., 13—Materials of Construction.....	3	....
Drawing, 6—Descriptive Geometry.....	2	....
Physics, 5—Electricity .....	....	2
Elect. Eng., 11—Workshop Mechanics.....	....	1

Third Year

	Lab. Hours	Class Hours
FIRST SEMESTER		
Elec. Eng., 1a—Direct Current Machinery.....	....	5
Physics, 6—Electrical Measurements.....	6	....
Civil Eng., 7, 8—Mechanics.....	....	5
Physics, 12—Thermodynamics .....	....	1
Elect. Eng., 6—Excursions.....	2	....
Physics, 10—Illumination .....	....	3

SECOND SEMESTER

Elect. Eng., 1b.....	5
Elect. Eng., 2—Dynamo Laboratory.....	6
Civil Eng., 7, 8—Mechanics.....	5
Elect. Eng., 6—Excursions.....	2
Drawing, 7—Machine Design.....	3

Fourth Year

FIRST SEMESTER

Elect. Eng., 3a—Alternating Currents.....	5
Elect. Eng., 7—Dyn. Lab. A. C. Mach.....	6
Elect. Eng., 8—Theory of Electricity.....	2
Elect. Eng., 12—Thesis.....	3
Economics, 1	3
Elect. Eng., 6—Excursions.....	2

SECOND SEMESTER

Elect. Eng., 3b—Alternating Currents.....	3
Elect. Eng., 3—Electric Railroads.....	2
Elect. Eng., 7—A. C. Lab.....	6
Civil Eng., 9—Hydraulics.....	3
Elect. Eng., 12—Thesis	3
Economics, 1	3
Elect. Eng., 6—Excursions.....	2
Elect. Eng., 10—Transmission.....	2

COURSES IN ELECTRICAL ENGINEERING

1a. Dynamo Electric Machinery. This course comprises a study of the theory and operation of direct-current generators and motors. Text: "Elements of Electrical Engineering," Vol. 1, by Franklin and Esty. Five hours; first semester.

1b. Dynamo Electric Machinery. This course comprises a study of electric distribution and lighting and the elementary principles of Alternating Currents. Five hours; second semester.

Text—Pender's "Principles of Electrical Engineering."

2. Dynamo Laboratory. Study is made of the performance of direct-current machines by means of their characteristic curves; efficiency, regulation, and heat tests are run; and various methods of operating generators and motors and their auxiliary control apparatus are studied. Junior year. Six periods; second semester.

3a. Alternating Currents. A mathematical study of the theory and applications to modern machinery. Study of text and lectures, Five hours; first semester.

Text—Jackson's "Alternating Currents."

3b. Alternating Currents. Continuation of 3a. Three hours; second semester.

4. Steam Engineering. Boilers, combustion, fuels, laws of gases and heat-conduction, corrosion and scale, testing, flow of steam in pipes, etc. Practical apparatus as used in steam power plants. Two hours; first semester.

5. Steam Engineering. A study of various types of steam turbines and steam engines, indicator cards, valve motions and diagrams, multiple expansion, design of parts. General layout of plants. Two hours; second semester.

Text—Benjamin's "The Steam Engine."

6. Excursions. Trips to various power plants and factories with a view to observing methods and processes. Written reports required of students.

7. Dynamo Laboratory. Tests and study of alternating current apparatus. Senior year. Six periods; both semesters.

8. Theory of Electricity. The electrical units and their dimensions; laws of circuits; theories of electric conduction in solids, gases, and electrolytes; valve actions; etc. Two hours; first semester.

9. Electric Railroads. Railway engineering, power-plant engineering, water-power installation, economics of electrical engineering, etc. Two hours; second semester.

Text—Ashe & Keiley's "Electric Railways."

10. Transmission and Station Equipment. A study of the commercial problems of electric-power generation and distribution, and of standard polyphase machinery. Two hours; second semester.

Text—Ferguson's "Electrical Transmission."

11. Workshop Mechanics. A consideration of the materials of machine construction, of the methods of working them, and of workshop appliance. Lectures, no credits, but required of all graduates in Electrical Engineering.

12. Thesis. An original investigation and study of some special problem.

MINING AND CHEMICAL ENGINEERING

The University is at present offering two years of the course in Mining and Chemical Engineering. The work, as outlined, gives thorough training in the fundamental subjects of mathematics, chemistry, physics, drawing and the elements of engineering. The foundation laid in the two years prepares the student to enter any of the good mining colleges, and complete the work of the Junior and Senior years, specializing in Mining and Metallurgy.

The University does not as yet give degrees in Mining or Chemical Engineering. Students desiring to do their full course at the University and specialize in chemistry may, however, by satisfying the requirements of the College of Liberal Arts in language, economics, and psychology, select their courses from chemistry, and the special engineering courses for which credit is given in the College of Liberal Arts, and be graduated with the Bachelor of Arts degree.

FIRST TWO YEARS' COURSE IN MINING OR CHEMICAL ENGINEERING

Freshman Year

	First Semester	Second Semester
English, 1	3	3
Mathematics, 4, 5, 6.....	5	5
Chemistry, 2, 2a, 3, 3a.....	5	5

Civil Engineering 1	2	2
Civil Engineering 2 (Field Work).....	2	2
Drawing, 4, 5.....	2	2

Sophomore Year

Mathematics, 8, 9—Calculus.....	3	3
Geology, 3—Mineralogy	2	2
Eng. Drawing, 6—Descriptive Geometry.....	2	2
Physics, 1a, 1b, 2a, 2b.....	5	5
Chemistry, 4, 8.....	4	4

For courses in English, Mathematics, Mineralogy, Physics, Drawing and Civil Engineering, see the courses as listed under Civil and Electrical Engineering.

2. Inorganic Chemistry. Non-metals. Lectures and recitations with classroom demonstrations on the non-metals. Especial emphasis is placed on the principles and laws of inorganic chemistry, and their application in analytical work. Smith's "Chemistry for Colleges," and Stieglitz' "Elements of Qualitative Chemical Analysis," Vol. 1. To be taken in connection with 2a. Three units; first semester.

2a. Qualitative Analysis. Metals. A laboratory course covering the reactions of the salts of the metals in known solutions, and the separation and identification of the same in unknown mixtures; the analysis of metals, amalgams, and alloys. Six hours a week in the laboratory. Two units; either semester.

3. Inorganic Chemistry. Lectures and recitations on the metals and metalloids, and their chief compounds, with especial reference to their technical value and commercial use. Smith's "Chemistry for Colleges." To be taken in connection with courses 2a or 3a. Three units; second semester.

3a. Qualitative Analysis. Non-metals. A laboratory course covering the reaction of the salts of the non-metals and their identification, and the complete analysis of simple and complex salts, ores, and commercial products. Six hours a week in the laboratory. Two units; second semester.

4. Quantitative Analysis. Laboratory practice in gravimetric and volumetric determinations, with occasional lectures and recitations. Talbot's "Quantitative Chemical Analysis."

8. Mineral Analysis. Gravimetric and volumetric analysis of representative minerals, ores, and alloys. Prerequisite, course 4. Three or five units, either semester.

ARCHITECTURE

A four years' course in the theory and practice of architectural planning and composition, the history and the development of its classic forms and a study of the methods of structural design.

First Year

	First Semester	Second Semester
Mathematics, 4, 5, 6.....	4	5
Chemistry, 2, 2a, 3, 3a.....	5	5
English, 1	3	3
Drawing, 1, 3.....	2	2
Design	1	1
Drawing—Charcoal from cast.....	1	---
Drawing—Out of door sketching.....	1	1
Art History	1	---
Mythology	---	1

Second Year

Mathematics, 7, 8—Calculus.....	3	3
Physics, 1abc, 2abc.....	3	3
Drawing, 6—Descriptive Geometry.....	2	2
Architecture, 1—Architectural Drawing.....	2	2
Architecture, 3—History of Ornament.....	1	1
Water Colors	1	1
Design	2	2
Civil Eng., 13—Materials of Construction.....	3	---
Drawing—Drawing from life	---	1

Third Year

	First Semester	Second Semester
Civil Eng., 8—Strength of Materials.....	2	3
Architecture, 2—Architectural Drawing.....	2	2
Architecture, 4—History of Architecture.....	1	1
Architecture, 5—Design of Historic Styles....	2	2
Architecture, 6—Architectural Rendering.....	2	2
Civil Eng., 15, 16—Graphic Statics, Stresses..	2	3
Architecture, 7—Heating and Ventilating.....	2	....
Architecture, 8—Bldg. and Equip. Eng'r'g..	....	2
Drawing—Out of door sketching.....	1	....
Anatomy	1	....
Clay Modeling .....	....	3
Civil. Eng., 18—Structural Design.....	....	3

Fourth Year

Civil Eng., 18—Structural Design.....	3	3
Civil Eng., 21—Reinforced Concrete.....	3	3
Architecture, 9—Interior Decoration.....	2	2
Architecture, 11—Advanced Arch. Design....	2	3
Architecture, 10—Landscape Design	2	....
Economics, 1	3	3
Civil Eng.—Contracts and Specifications.....	....	1
Thesis.		

COURSES IN ARCHITECTURE

1. **Architectural Drawing.** This course begins with the making of working drawings of small buildings. It includes the framing plans of the floors, walls, and roof and full size details of some of the essential portions. Six hours, throughout the year.

2. **Architectural Drawing.** The making of elevations, floor plans and construction details for large buildings, such as stores, hotels, loft and office buildings. Six hours, throughout the year.

3. **History of Ornament.** A study of the origin and the basic qualities of ornament and its application to the architecture of the various periods. One hour, throughout the year.

4. **History of Architecture.** A course tracing the development of building from the earliest times to the present day. One hour, throughout the year.

5. **Design in Historic Styles.** To be taken in conjunction with Architecture 4. It consists of exercises in original designs illustrating the different styles.

6. **Architectural Rendering.** Practice in line work, shades and shadows and color, and technic in various mediums. Six hours throughout the year.

7. **Heating and Ventilation.**

8. **Building Equipment Engineering.**

9. **Interior Decoration.** A series of practical and theoretical problems in the decorating of the interiors of public and private buildings.

10. **Landscape Design.** Lectures and practice in planning and design of grounds and parks.

11. **Advanced Design.** Original advanced work on some assigned problem.

COURSES IN DRAWING

1. **Elementary Mechanical Drawing.** Lettering, geometric problems, projection, development, and intersection. Six hours, two units; first semester.

2. **Advanced Mechanical Drawing.** Isometric projection, tinting, line shading, and machine drawing. Six hours, two units; second semester.

3. **Elements of Practical Perspective.** Six hours, two units; first semester.

4. **Machine Drawing.** Drawing details, and assemblies of machine parts from sketches made in the laboratories or from blue prints. Designing simple machines. Lectures and

drafting. Four hours, two units; first semester. An examination in orthographic projection will be given to all students entering this course.

5. Technic of Drawing. The technical details of drafting in connection with steel construction, topographical mapping, electrical diagrams, curved shading, etc. Four hours, two units; second semester.

6. Descriptive Geometry and Stereotomy. Advanced study of the representation of lines, surfaces and solids, shades and shadows, from a mathematical standpoint; linear perspective and stereotomy. Four hours, two units; both semesters.

7. Machine Design. Advanced course in mechanical and electrical design, detailing, working drawings of complicated machine details, study of standard commercial machine parts, shop practice, strength of parts, use of tables, formulae, slide rule, gearing, estimating, specifications, structural iron and steel. Three units; second semester.

COURSES IN PHYSICS

1a. General Physics. Electricity. Lectures and recitations. Three units; first semester.

1b. General Physics. Heat. Lectures and recitations.

1c. Physical Measurements. Laboratory work in Electricity or Heat or both. One or two units; first semester.

2a. General Physics. Mechanics. Lectures and recitations. Three units; second semester.

2b. General Physics. Light. Lectures and recitations. Two units; second semester.

2c. Physical Measurements. Laboratory work in Mechanics or Light or both. One or two units; second semester.

All the above courses are required of all Engineering students and of students majoring in Physics. Duff's "Physics" is the basis of the class room work and Miller's "Laboratory Physics" is followed in the laboratory.

3. **Mechanics.** An advanced laboratory course continuing course 2; may be taken concurrently with it. Experiments are made along such lines as the moment of inertia, uniformly accelerated motion, modulus of rigidity, force of gravity, etc. Four periods of laboratory work per week, with occasional lectures. Two units; either semester.

4. **Shop Work.** Instruction in the use of wood and metal working tools and machinery, including cutting, filing, drilling, tapping, polishing, screw-cutting and elementary lathe work. Two or four periods in laboratory, one or two units; either semester.

5. **Applied Electricity.** A course in the principles and applications of electricity. Prerequisite, Physics 1a. Two units; second semester.

6. **Electrical Measurements.** A laboratory course in which the theory and methods of exact electrical determinations are taken up, including the determination of resistance by various methods, galvanometer constants, the measurement of current and electromotive force, insulation tests, hysteresis and permeability tests, the calibration of instruments, the use of condensers, the measurement of induction, etc. Six periods per week. Two units; either semester.

7. **Advanced Heat.** A laboratory course consisting of work of the nature set forth in Millikan's "Mechanics, Molecular Physics and Heat." Four periods in the laboratory, with occasional lectures. Two units; either semester.

8. **Advanced Light.** A laboratory course involving considerable work with the spectroscope and interferometer.

9. **Mechanism.** The mechanics of link motions, cams, quick-return motions, etc.; belts and rope drive; graphical solutions of mechanical movements and forces; gearing. Two units; first semester.

10. **Photometry and Illumination.** Lectures and recitations. A study is made of the physiological and physical phenomena of artificial illumination, methods of measurement, types of photometers, types of illuminants and their characteristics, reflectors, and the principles of interior and street illumination. Three units; first semester.

11. **Photometry.** A laboratory course to accompany Physics 10. One or two units; first or second semester.

12. **Thermodynamics.** A study of the laws of gases, heat cycles, temperature-entropy diagrams, pressure-volume diagrams applied to gas, hot air and steam engines and refrigerating machines. One unit; first semester.

13. **Sound.** General principles, theory of vowel sounds, construction of musical instruments, architectural acoustics. Two units; first semester.

14. **Radio-activity and Passage of Electricity Through Gases.** Lectures and recitations. Two units; second semester.

THESIS WORK

The following is a partial list of subjects which represent the scope of original work done by the students of engineering under the head of thesis investigation:

Design of a three-hinged reinforced concrete arch.

A design for a highway bridge.

The design for a sewer system for Huntington Beach, Cal.

Design of a seven-story office and theater building.

Plans for a boulevard to San Pedro, Cal.

Design for a sewer system for San Bernardino, Cal.

Plans for an elevated railroad system.

Design for a Science Hall for the University.

Design for a seven-story reinforced concrete building.

A study of the plans for sewage disposal in the San Gabriel valley.

Design of concrete dam and plans for an irrigation project.

Hydro-electric development on the San Gabriel River.

An investigation of Los Angeles Railway traffic conditions.

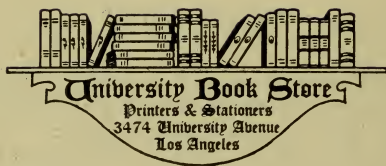
An illumination survey in connection with electric lighting.

Design of a hydro-electric plant.

A test of power demands on office buildings.

Laboratory tests of variable speed alternating current motors.

The design of an integrating photometric device.







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